HAYSPUR HATCHERY
ANNUAL REPORT

October 1, 1984 to September 30, 1985

by
John R. Thorpe
Hatchery Superintendent II

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ABSTRACT

Hayspur Hatchery is both a production and broodstock station for an unspecified strain of rainbow trout (R1). In 1984, 611 female trout were spawned, yielding 2,362,050 eggs. Nearly 88% of these eggs were successfully eyed. Transfers of rainbow trout totaled 378,031 (13,594.4 lb) during 1985. During 1985, hatchery personnel reared and stocked 665,496 (12,385 lb) fingerlings, 238,190 (65,116 lb) catchable and 600 (3,600 lb) excess broodstock rainbow.

Fish feed utilized in production totaled 155,326 pounds at a cost of $27,815.36. Conversion was 1.61:1 and cost 29 cents per pound of fish produced.

Nitrogen gas bubble disease was controlled with packed column degassers. A low-cost media 12-gauge plastic shot cup was tested and found effective in packed columns with low water flows.

Rainbow trout eggs were water-hardened in Argentyne at concentrations of 1:50, 1:100, 1:200 and 1:300. No significant difference in eye-up or survival to growth of fry was found between groups treated with Argentyne and those water-hardened in spring water.

Delayed fertilization of up to 10 days on rainbow trout eggs was tested. Fertility was poor during the first 4 days and zero thereafter.

Author:

John R. Thorpe
Hatchery Superintendent II

INTRODUCTION

Hayspur Fish Hatchery is a rainbow trout production and broodstock station located on Loving Creek, a tributary to Silver Creek of the Malad River drainage. Approximately 18 miles southeast of Hailey between Gannet and Picabo, the hatchery is a point of interest for visitors in the Sun Valley area (Fig. 1). Originally established in 1906, Hayspur is the oldest trout hatchery now within the Idaho Department of Fish and Game (IDFG). The hatchery's popularity with tourists is enhanced by a broodstock pond holding some 4,000 adults, a public campground, and its close proximity to the Nature Conservancy's Silver Creek Preserve.

Loving Creek provides 18 cfs of variable water temperature (Fig. 2) for rearing catchable trout in the large raceways and lagoon (Figs. 2 and 3). Two artesian wells provide an additional 1.5 cfs of 53°F water to the large raceways. Cool water from the broodstock pond is pumped to the headrace from May through August to maintain water temperature below 70°F. Incubators, vats and small raceways share 4 cfs of 53°F spring water piped from a developed spring on the hatchery. Several undeveloped springs provide an estimated 0.5 to 1.0 cfs of additional water to the broodstock pond.

The fish-rearing facilities include: 17 eight-tray stacks of Heath incubators, 20 concrete vats (13 ft x 2.5 ft), 8 small concrete raceways (7 ft x 100 ft), 6 large concrete raceways (12 ft x 400 ft) and one earthen pond (100 ft x 500 ft). Broodstock are reared in an earthen pond (150 ft x 400 ft) and trapped for spawning in one of the small concrete raceways.

OBJECTIVES

1. To raise 110,000 pounds of catchable rainbow trout for stocking in waters of Region 4 and Region 6 and for transfer to other state hatcheries.

2. To distribute approximately 250,000 catchable and 800,000 fingerling rainbow trout.

3. To rear rainbow trout broodstock and take 3.5 to 5.5 million eggs for rearing at the Hayspur Fish Hatchery and transferral to other state hatcheries.

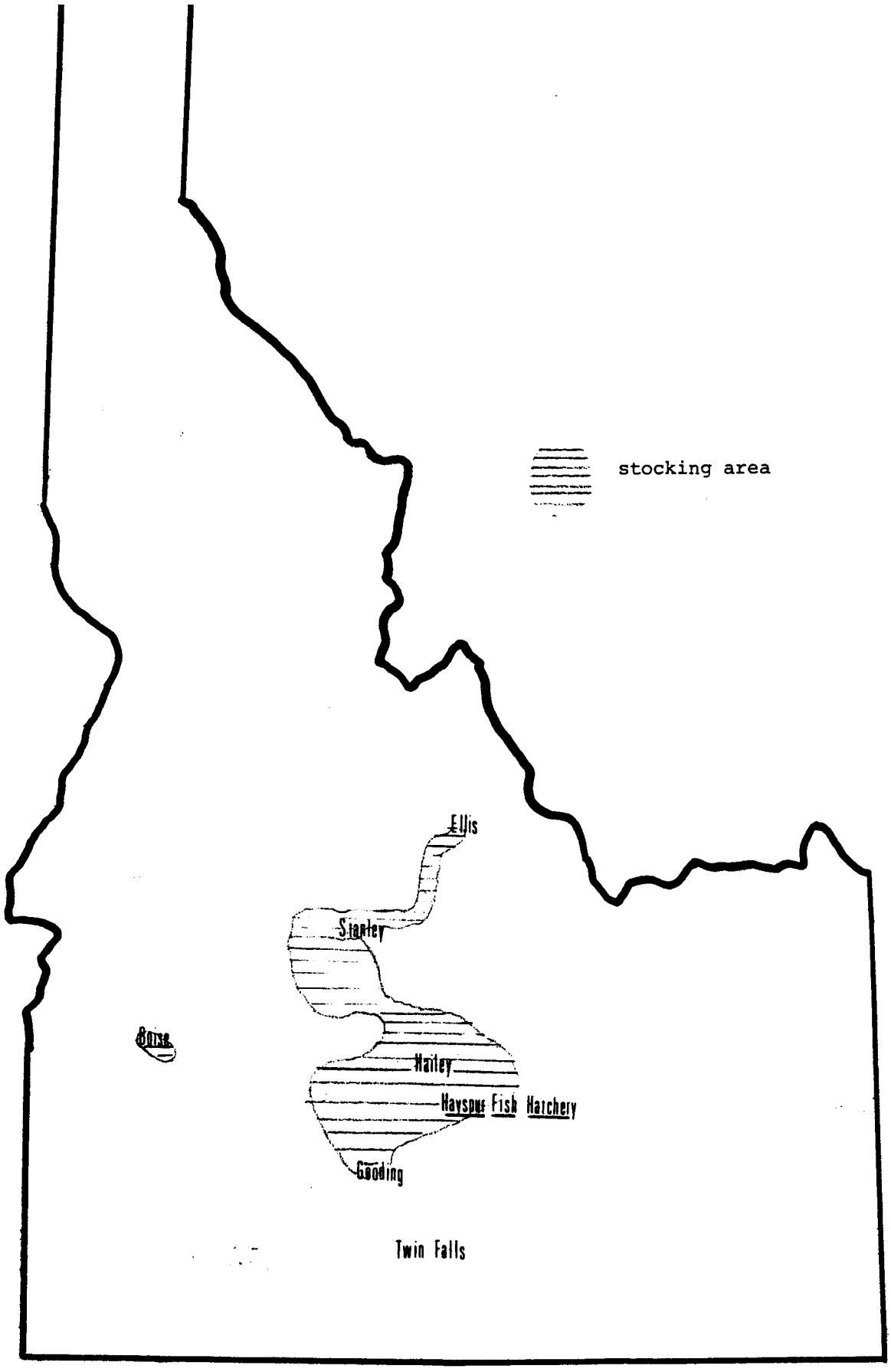

Figure 1. Trout stocking area covered by the Hayspur Fish Hatchery.

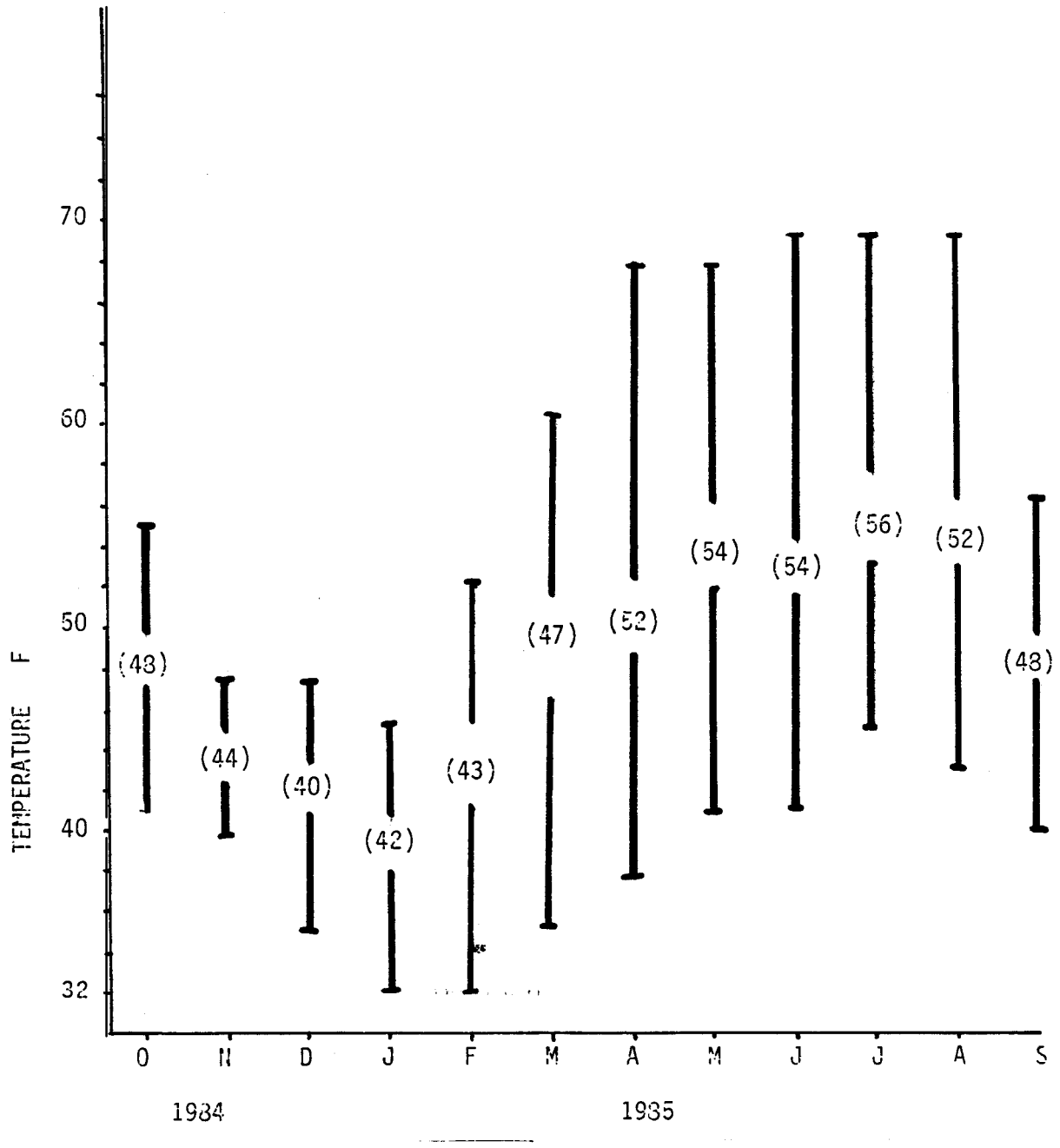

Figure 2. Monthly temperature ranges and average daily temperature in Loving Creek water at the Hayspur Fish Hatchery.

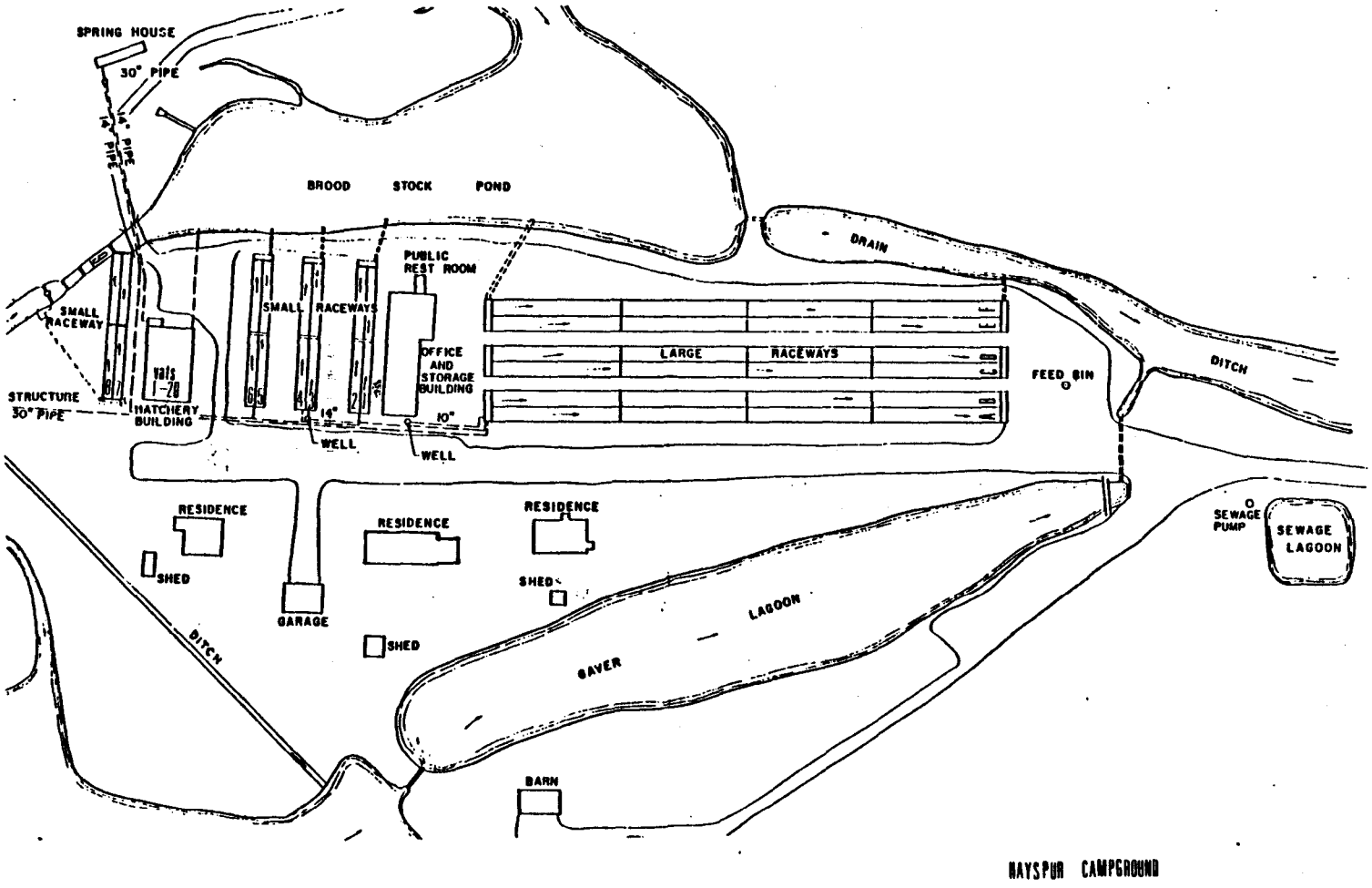

Figure 3. Map of Hayspur Fish Hatchery grounds.

Loading

Heath incubators are loaded with approximately 160 oz of green eggs per tray. Green eggs are enumerated using the Von Bayer Method (Leitritz and Lewis 1976). Water temperature is a constant 53°F and flow varies from 4 to 5 gpm/stack. After the eggs accumulate 300 temperature units (TU), they are shocked by siphoning and allowed to set 24 hours prior to removal of dead eggs (Leitritz and Lewis 1976). Dead eggs are removed with a mechanical egg sorter and by hand picking. Both eyed eggs and dead eggs are enumerated using the Burrows Displacement Method to obtain an accurate estimate of eyed eggs as well as to determine eye-up percentage (Burrows 1951). Eyed eggs are then loaded at 38 oz (Burrows Displacement) per tray for hatching. Trays are examined and hand picked to remove any dead eggs from eye-up to ponding.

Fry are transferred to vats at 60,000/vat for 49 days (1,029 TU) after fertilization. This number can be successfully reared to 250/lb for transferral to outside concrete raceways without splitting prior to the transfer. A Density Index (DI) of 2.0 and Flow Index (FI) of 5.0, as described by Piper et al. (1982), are upper limits of fish density where feed conversion and growth rate drop while mortality becomes elevated.

Fish are reared in small raceways until stocked as fingerlings or transferred to large raceways for rearing. The DI is kept below 0.4, but due to a maximum flow of 0.33 cfs per raceway, FI reaches 4.0 in meeting production goals for fingerlings.

Large raceways are loaded for hold over fish in September. Numbers of fish are set low enough not to exceed 12,000 lb per raceway (FI = 1.0). Water temperatures in excess of 65°F from April until August require close monitoring of fish in large raceways (Fig. 2).

Hygiene

All egg-handling equipment is disinfected in a 1:100 solution of Argentyne. To prevent fungus development in green and eyed eggs, a 15-minute flush of formalin at a 1:600 concentration was administered daily, Monday through Friday. Formalin treatments were discontinued 25 days after fertilization to prevent treating early hatching fry.

Hatchery vats and small raceways are cleaned daily and mortality removed. Fish handling equipment, vats and small raceways are disinfected in a 1:300 solution of benzalkonium chloride (50%) to prevent disease transfer between groups of fish.

Large raceways are swept clean Monday, Wednesday and Friday. Screens are cleaned and mortality removed daily. Fish handling equipment is disinfected in 1:300 benzalkonium chloride (50%) prior to use in different raceways.

All mortalities and dead eggs are disposed of in a covered pit to reduce possible disease transfer to both hatchery fish and wild trout in adjacent waters.

Weighing and Enumerating Fish

All lots are sample-weighed on the 15th and last day of each month to evaluate growth. Feed levels, conversion, growth rates and loading are monitored from these samples.

Total lengths are periodically taken to verify actual condition factor, $C = \text{weight-length}^3$. Measurements taken during Fish Year 1985 indicate that Hayspur fish have a length-weight relationship very close to $C = 0.0004$ throughout the year. The length-weight table for $C = 0.0004$ found in Piper et al. (1982) is used to determine length increase when pound counts are taken.

Total weight and enumeration of lots is accomplished at transfer between containers. Eggs transferred to vats and fish transferred from vats to small raceways are weighed with a hanging spring scale. Fish transferred from small raceways to large raceways, between raceways and loaded for stocking are weighed by water displacement in a planting tank. Both planting tanks at Hayspur were recalibrated in 1985 with measured weights of both catchables and fingerlings using the hanging spring scale to determine weight.

Feeding

Feed levels are calculated using Haskell's Formula on the first and 16th day of each month (Piper et al. 1982). Length increase and conversion data were collected initially in Fish Year 1985 for the Hayspur environment. Current feeding levels are calculated using a hatchery constant (HC) 6.25 in vats and 7.8 in small raceways while fish are in spring water. Fish reared in Loving Creek water exhibit extremely variable growth throughout the year and have feed levels calculated based on HC of 3.75 to 16.5. Feed is weighed out for individual vats and raceways each morning and hand fed eight and four times/day, respectively. Large raceways and the lagoon are fed twice daily by blower feeder. Feed ration is varied by raceway for fish size, desired growth and total weight.

FISH PRODUCTION

Hayspur Fish Hatchery is both a broodstock and production facility for an unspecified strain of rainbow trout. All eggs reared were obtained from broodstock on station. On October 1, 1984, there were 336,049 (28,933 lb) subcatchable (11.6 fish/lb) rainbow trout and 14,764 (5,678 lb) catchable (2.6 fish/lb) rainbow trout remaining to be stocked in October 1984 held on station. From October 1, 1984 to September 30, 1985, Hayspur Hatchery transferred 378,031 (13,594 lb) rainbow trout to other stations (Table 1). During that same period, 904,286 (81,101 lb) rainbow trout were stocked to state waters (Table 2). On September 30, 1985, there were 289,802 (40,246 lb) subcatchable (7.2 fish/lb) rainbow trout held for rearing and release in 1986. From spawntaking in 1984, 2,362,050 eggs were collected with 87.92 eye-up. The total trout production from October 1, 1984 to September 30, 1985 was 100,330.4 lb, with 1,282,317 rainbow trout stocked or transferred.

FISH HEALTH

There were no major health problems during 1985. The broodstock were positive when tested for infectious pancreatic necrosis (IPN) virus in 1983, but tested negative in December 1984 when both tissue and ovarian fluid samples were used (Thorpe 1984). The perennial gas bubble disease outbreak in the spring did not appear after the installation of packed columns this year. Poor water quality in Loving Creek and crowding in the small fingerling raceways brought on some gill disease problems as water temperature and turbidity increased in May.

The broodstock were sampled in December 1984 to determine the presence of pathogens prior to clearing eggs for transfer. Although testing was negative, no eggs were transferred from the 1984 egg take. To reduce introduction of pathogens into the broodstock pond, Loving Creek water to the pond has been stopped and the practice of feeding picked dead eggs to broodstock has ceased.

The nitrogen supersaturation problem received primary attention this year. Using a variety of degasing packed columns, we had no visible sign of gas bubble disease this year. The physical dimensions of our hatchery vats and lack of water pressure limited packed columns to 24 inches. In the interest of improving our rate of degasification, several sizes of plastic media were used and tested in reducing nitrogen in hatchery vat water. Tables 3 and 4 display the results and indicate that 12-gauge plastic shot cups were as good or better than Koch rings in reducing nitrogen and increasing dissolved oxygen. Additionally, the cost of shot cups was 25% of the amount for one-inch Koch rings. Packed columns, 8" x 24", filled with shot cups have been installed on all vats this year.

Table 1. Fish transfers from Hayspur Hatchery, October 1, 1984 to September 30, 1985.

Date	Species	Receiving station	Number	Pounds	Size (fish/lb)
2-06-85	R9	Hagerman Hatchery	320,631	594.4	539
5-23-85	R9	Mullan Hatchery	28,000	7,000	4.0
6-24-85	R9	Mullan Hatchery	29,400	6,000	4.9
Total			378,031	13,594.4	

Table 2. Fingerling, catchable and broodstock stocked from Hayspur Hatchery, October 1, 1984 to September 30, 1985.

Species	Size	Number	Pounds
Rainbow trout	3-6 inch	665,496	12,385
Rainbow trout	6 inch plus	238,190	65,116
Rainbow trout	broodstock (6 = 5 lb)	600	3,600
Total		904,286	81,101

Table 3. Percentage nitrogen saturation and dissolved oxygen in spring water as measured in rearing vats at Hayspur Fish Hatchery to compare degassification with 1.5" Koch rings vs. 12-gauge plastic shot cups in 8" x 24" packed columns.

	Untreated water	1.5 inch Koch rings	12-gauge plastic shot cups
Date	1/11/85	1/11/85	1/11/85
Dissolved oxygen	9.8 ppm	9.8 ppm	9.4 ppm
Percent N_2 saturation	108.5	104.9	103.8
Date	3/12/85	3/12/85	3/12/85
Dissolved oxygen	8.9	5.1	6.9
Percent N2 saturation	119.0	114.0	111.0

Table 4. Percentage nitrogen saturation and dissolved oxygen in spring water as measured in rearing vats at Hayspur Fish Hatchery to compare degassification using 1.5" Koch rings, 1.0" Koch rings, and 12-gauge plastic shot cups in 8" x 24" packed columns.

	Untreated water	1.5 inch Koch rings	1.0 inch Koch rings	12-gauge plastic shot cups
Date	4/4/85	4/4/85	4/4/85	4/4/85
Dissolved oxygen	8.3 ppm	6.5 ppm	7.4 ppm	8.4 ppm
Percent N_2 saturation	116.0	108.0	111.0	111.0
Date	4/30/85	4/30/85	4/30/85	4/30/85
Dissolved oxygen	7.4	5.7	7.0	6.4
Percent N_2 saturation	124.7	114.5	116.8	112.9

The small raceways were subject to losses due to gas bubble disease in the past. This past winter, we installed 5 ft plastic columns using 1.5" Koch rings on six small raceways. The historical gas bubble disease problem did not appear, although the lowest reading of nitrogen saturation was 109%.

An infestation of Gyrodactylus elegans, with accompanying losses due to peduncle disease (Cytophaga psychrophila) as described by Leitritz and Lewis (1976), were observed in December 1984 and January 1985. Initial treatment with copper sulfate did not reduce low-level mortality, but treatment with a 1:4000 flush of formalin was successful.

Occasional outbreaks of bacterial gill disease were treated with copper sulfate or benzalkonium chloride.

FISH TRANSFERS AND RELEASES

During 1985, 320,631 fry were transferred to Hagerman Hatchery as excess to Hayspur needs. Mullan Hatchery received 57,400 catchable trout for redistribution (Table 1). During February 1985, Hayspur received 275 Arlee strain brood fish from the Ennis National Fish Hatchery.

Fish were stocked in waters of regions 4 and 6 (Fig. 1). In addition to fingerlings and catchable rainbow trout, some 600 excess broodstock were released in the Boise River during January 1985 (Table 2).

SPAWNTAKING OPERATIONS

During 1984, 611 female rainbow trout were spawned and averaged 3,866 eggs per female. The egg size using Von Bayer measurement averaged 224 eggs/oz. Total take was 2,362,050 eggs with 87.9% eye-up.

Broodstock are kept in a 150 ft x 400 ft earthen pond fed by undeveloped springs and outflow from the hatchery and small raceways. Spawning adults are attracted into Raceway 7 by the installation of a ladder and finger weir in mid-September (Fig. 3). Spawntaking commences in early October and continues through early January. Adults are sorted and spawned once a week. The number of adults spawned in any season is entirely dependent on their desire to move upstream and a good number of redds can be seen in the broodstock pond from natural spawning.

FISH FEED UTILIZED

Feed utilized in production was 155,326 lb at a cost of $27,815.36. Conversion of feed fed to pounds gained was 1.61:1 and a cost of 29 cents per pound of fish produced. The broodstock were fed 8,000 lb at a cost of $1,374.40.

SPECIAL STUDIES

Argentyne Water-Hardening

During the 1984 spawning cycle several lots of eggs were water-hardened in various concentrations of an iodophor, Argentyne. This test evaluated eye-up of eggs (Table 5) and survival of fry during the first 60 days of rearing (Table 6). Eggs were fertilized in the usual fashion and placed in buckets with 1:50, 1:100, 1:200, and 1:300 aqueous solutions of Argentyne for one hour, then rinsed in spring water prior to placing in incubator trays. There did not appear to be any significant difference in either survival or growth between different concentrations or the control groups.

Delayed Fertilization

We evaluated eye-up in rainbow trout eggs held 1 to 10 days prior to fertilization. Ten female rainbow trout were wiped with Argentyne, dried and then stripped into a dry colander. The eggs were thoroughly mixed, divided into 11 equal portions and sealed in plastic bags inflated with oxygen. The milt of 15 males was combined and divided into 11 separate bags and inflated with oxygen. Eggs and sperm were refrigerated at 36^0F and one bag of each combined every morning for 10 days. The eggs were incubated in Heath trays for 14 days and eye-up determined. Eye-up was inconsistent for days 1 through 5 (Table 7), and no fertilization occurred in eggs held over 5 days. There was an odor in the sperm samples after 4 days, and bacterial infection of those samples may have inhibited fertility. Thus, outcome of delayed fertilization was both poor and inconsistent.

HATCHERY IMPROVEMENTS

The main dam that diverts Loving Creek from the old channel to the hatchery washed out in October 1984 and was reconstructed by the IDFG Engineering crew in December 1984.

Table 5. Eye-up percentage in rainbow trout eggs water-hardened in various concentrations of Argentyne.

Argentyne concentration	Number of eggs	Eyed eggs	Eye-up percentage
Control	100,520	88,740	85.0
1:100	39,991	35,490	87.0
1:200	135,400	123,930	90.0
1:300	116,714	106,794	88.0
1:50	44,356	41,610	93.0
Control	368,496	342,144	93.0

Table 6. Survival in rainbow trout fry from eggs water-hardened in various concentrations of Argentyne.

Argentyne concentration	Number of fish in lot	Mortality after 60 days of rearing	Percentage mortality
Control	77,922	1,061	1.36
1:100	67,725	1,297	1.92
1:200	79,706	1,232	1.55
1:300	76,738	865	1.13
Control	77,259	1,573	2.04
1:50	41,610	1,086	2.61

Table 7. Fertility of rainbow trout eggs as determined by eye-up percentage following delayed fertilization.

Storage period (days)	Eggs sampled in lot	Percentage eye-up
0	100	81.0
1	100	4.0
2	100	43.0
3	100	74.0
4	100	0.0
5	100	2.0
6	100	0.0
7	100	0.0
8	100	0.0
9	100	0.0
10	100	0.0

All dam boards and screen frames were replaced to improve operation and reduce blow outs of rotten wood occurring in the past.

Packed column degasers were installed on vats and small raceways to deal with the nitrogen supersaturation problem in the spring water.

Both our 1-ton planting truck and the 1-ton 4 x 4 utility truck were replaced this year with a 4 x 4, 1-ton for planting fish and plowing snow and a 4 x 4 diesel tractor with snowblower and mower deck.

The homemade blower feeder was replaced with a Nielsen Feedmaster trailer-mounted feeder. This allows for the weighing of feed and the carrying of two sizes in the same trailer. A new "Chatillion" hanging scale and a triple-beam-balance gram scale were purchased and put into service to improve accuracy.

Improvement in the hatchery appearance was a major project and a constant concern. Pruning of trees and removal of excess junk were major projects. A new chain saw was purchased to speed up the pruning process.

All hatchery spaces had locks installed for security. There were either no keys or no locks for any hatchery spaces prior to October 1984.

The office and crew's quarters were repainted and outfitted with furniture.

MISCELLANEOUS ACTIVITIES

Our visitor traffic was heavy as usual with well over 8,000 visitors this year. When Gaver Lagoon was opened to fishing on Free Fishing Day, we had over 1,500 fishermen in the first three days. The opening of the lagoon for handicapped individuals only on Free Fishing Day attracted some 300 to 400 people and was appreciated by those involved.

The Wood River Retriever Club held field trials here during July. The event went well. The club installed 5 goose-nesting platforms and made a donation to habitat development following the event.

During the year, we had numerous tour groups of Cub Scouts and school children. We made presentations on hatchery operations and IDFG work in the area to school classes and interested groups.

HATCHERY NEEDS

1. Rebuild deteriorated walls on large raceways.
2. Install piping to feed spring water to large raceways.
3. A concrete holding facility for broodstock along with developing springs to feed it.
4. Install additional incubation facilities.
5. The entry roadway needs major repairs.
6. Fill and grade Gaver Lagoon so that fish can be removed easily for stocking.

ACKNOWLEDGMENTS

Hatchery staff during the year included: John R. Thorpe, Fish Hatchery Superintendent II; John T. Siple, Fish Hatchery Superintendent I; Douglas R. Burton, Fish Culturist; Richard D. Alsager, Fish Culturist; Willie Castle, Lyle Hammond, Pete Johnson, and Todd Vierra, laborers; and Billy Carr, SYETP.

The hatchery staff would like to thank Gary Gadwa, Conservation Officer, for his assistance in planting the Stanley Basin lakes and the Salmon River.

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Submitted by:

John R. Thorpe
Hatchery Superintendent II

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

David L. Hanson, Chief
Bureau of Fisheries

Steven M. Huffaker
Fish Hatcheries Manager